

# DCA3d

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- ❖ dca3d\_z
- ❖ track fitting momentum seed
- ❖ dca3d\_xy

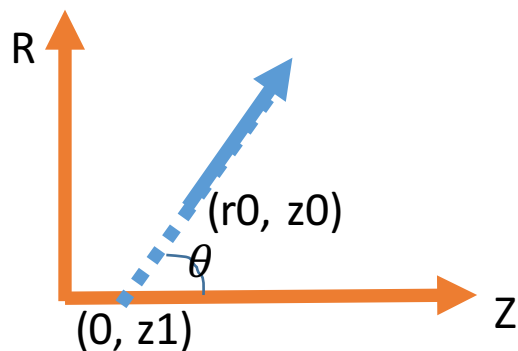
# dca3d\_z double peak structure

40 GeV mu+

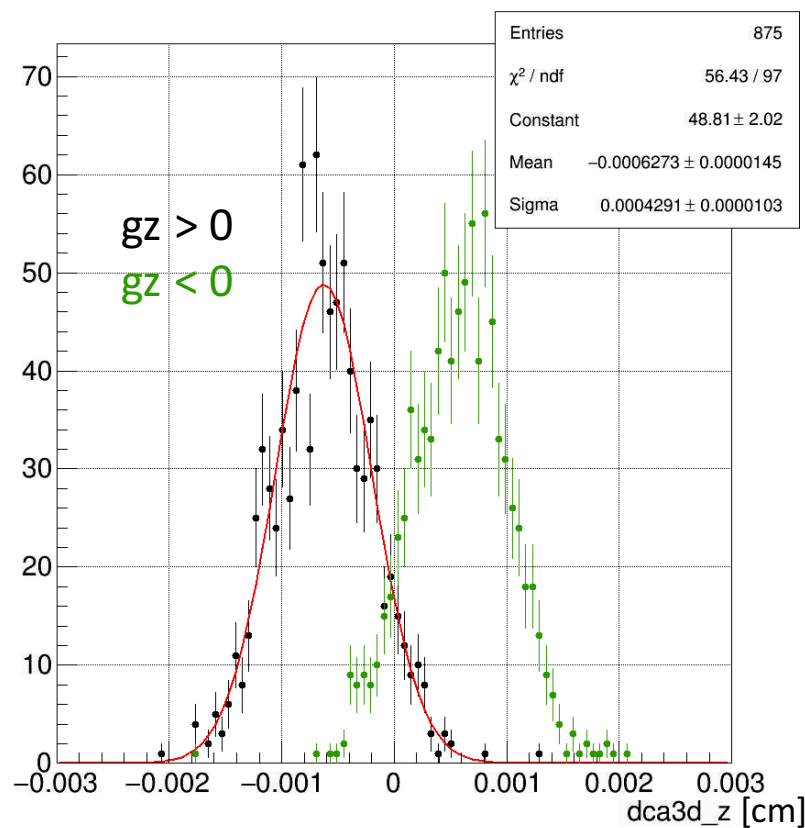
$\eta(-0.5, 0.5)$ ,

$\phi(-\pi, \pi)$ ,

vtx(-0.1, 0.1) cm

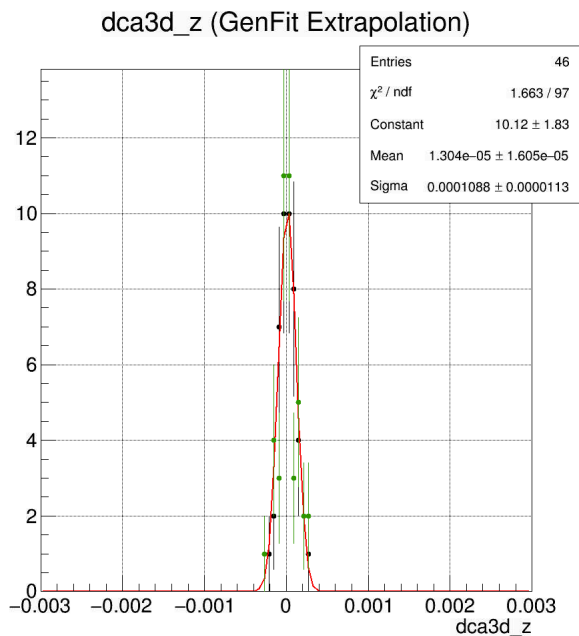


Cylindrical MAPS + TPC  
dca3d\_z (GenFit Extrapolation)

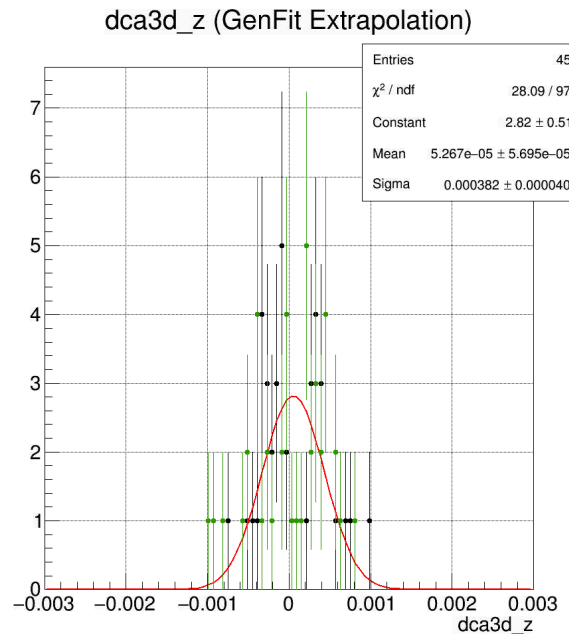


# Truth Tracking Test

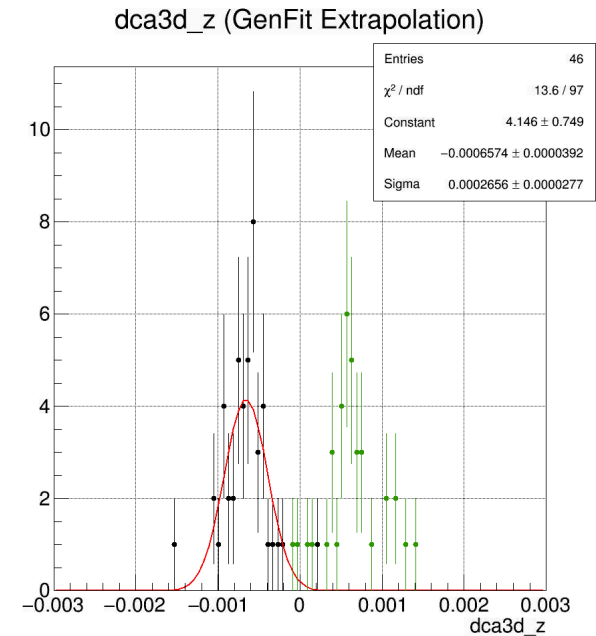
Truth tracking  
both MAPS and TPC



Truth tracking  
TPC only

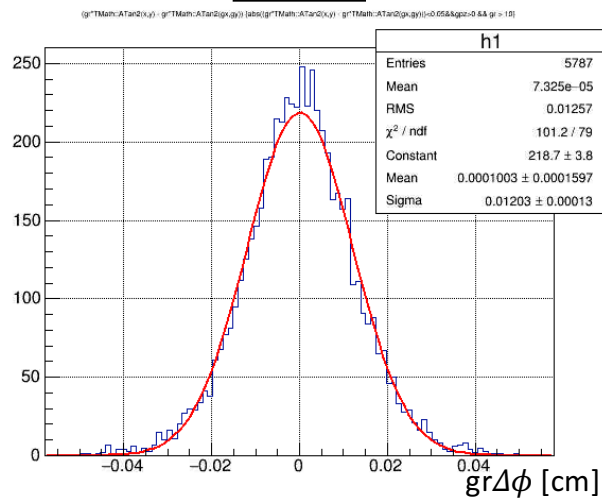


Truth tracking  
MAPS only

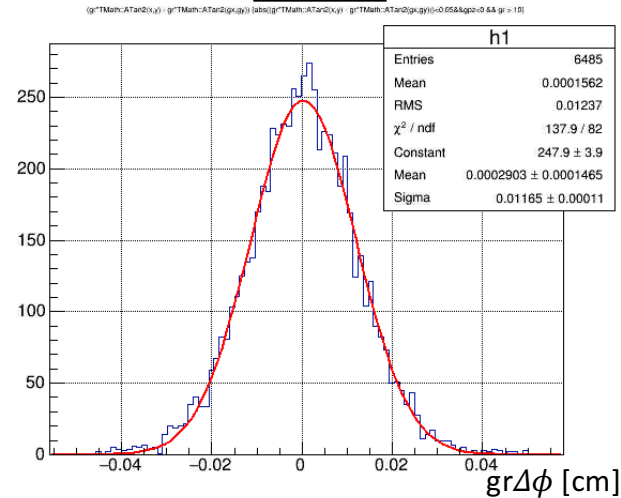


# TPC Clustering

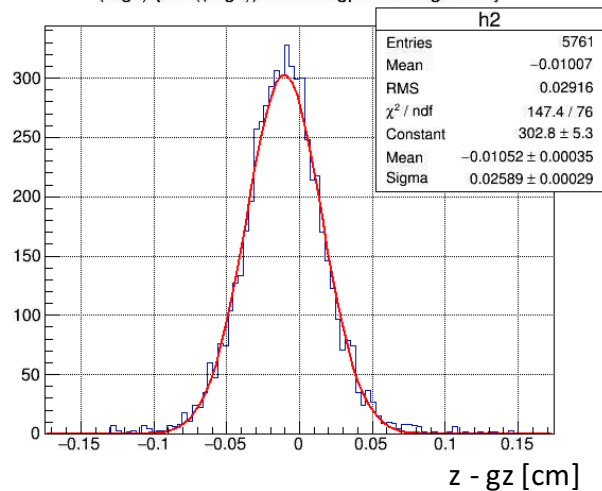
$gz > 0$



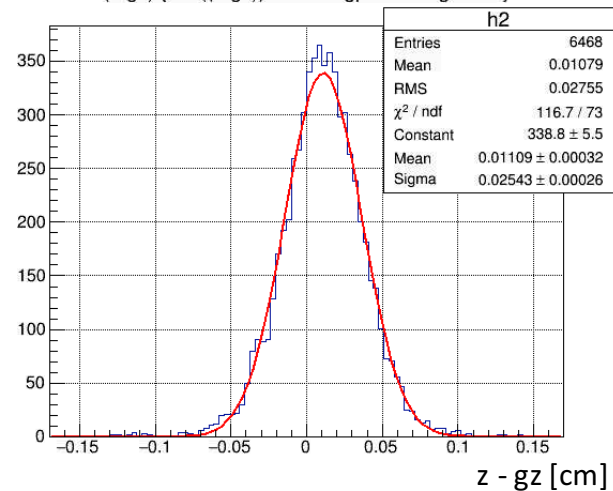
$gz < 0$



$(z - gz) \{ \text{abs}((z - gz)) < 0.15 \&\& gpz > 0 \&\& gr > 10 \}$

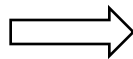


$(z - gz) \{ \text{abs}((z - gz)) < 0.15 \&\& gpz < 0 \&\& gr > 10 \}$



# PHG4CylinderCellTPCReco.cc

```
237     if ( z >= 0.0 ) z -= driftv * hiter->second->get_t(0);
238     else z += driftv * hiter->second->get_t(0);
```

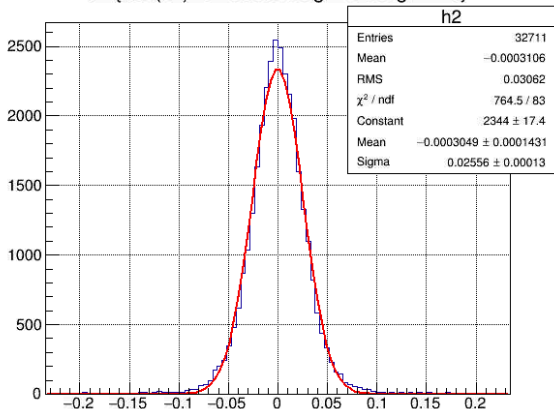


```
237     if ( z >= 0.0 ) z -= 0*driftv * hiter->second->get_t(0);
238     else z += 0*driftv * hiter->second->get_t(0);
```

TPC Cluster  $\Delta z$  after change

gz > 0

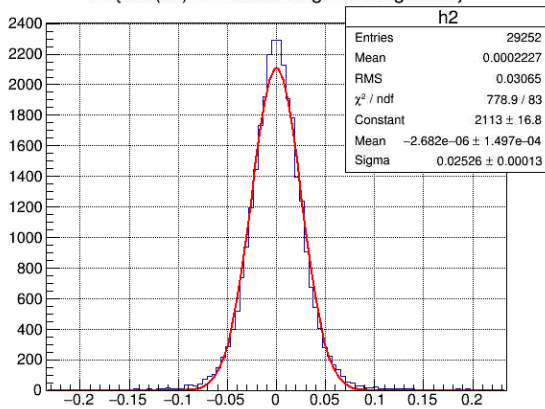
dz {abs(dz)<0.200000&&gz>0 && gr > 10}



z - gz [cm]

gz < 0

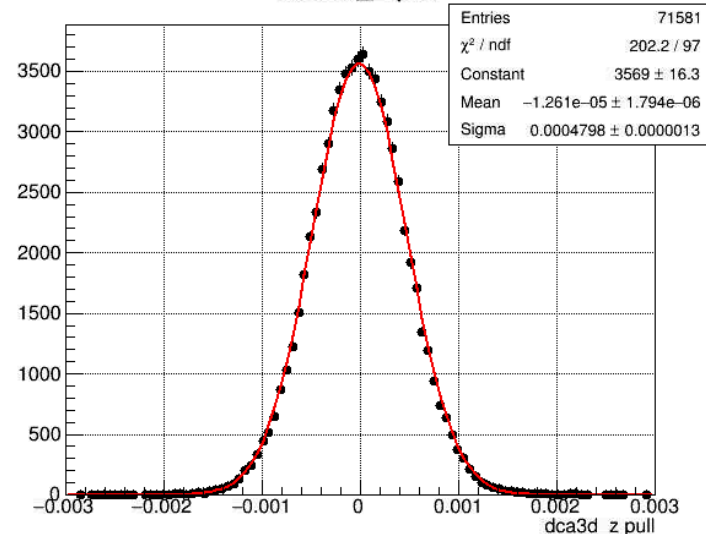
dz {abs(dz)<0.200000&&gz<0 && gr > 10}



z - gz [cm]

dca3d\_z pull after change

dca3d\_z pull



# Track fitting momentum seed

In the current sPHENIX repository, used momentum from Alan.

Changed to (100, 0, 0) fixed momentum for a while.

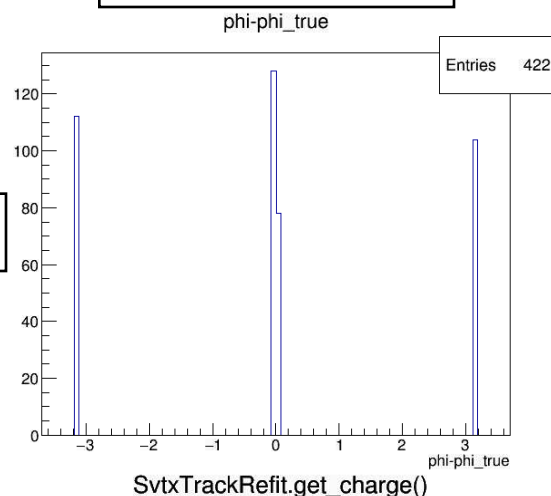
Noticed that gave opposite charged and opposite direction tracks.

So changed to use 100 GeV along most out measurement.

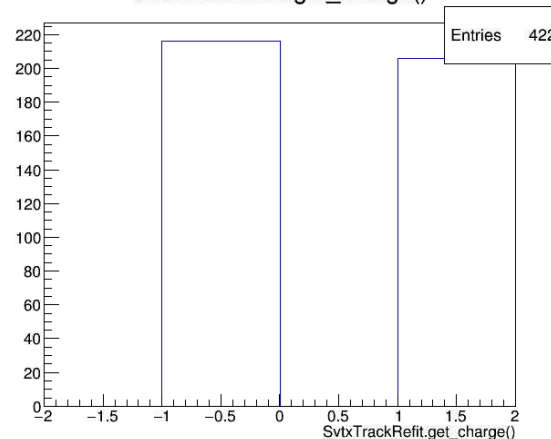
40 GeV mu+  
 $\eta(-0.5, 0.5)$ ,  
 $\phi(-\pi, \pi)$ ,  
vtx(-0.1, 0.1) cm

phi - truth phi

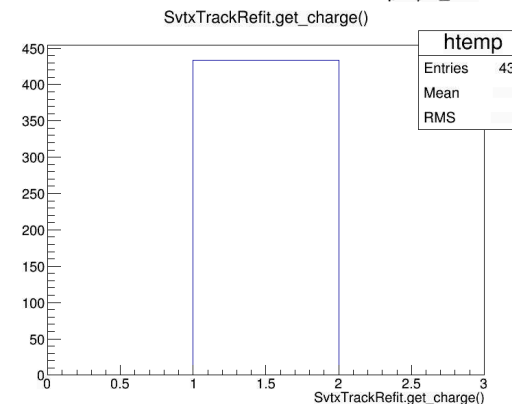
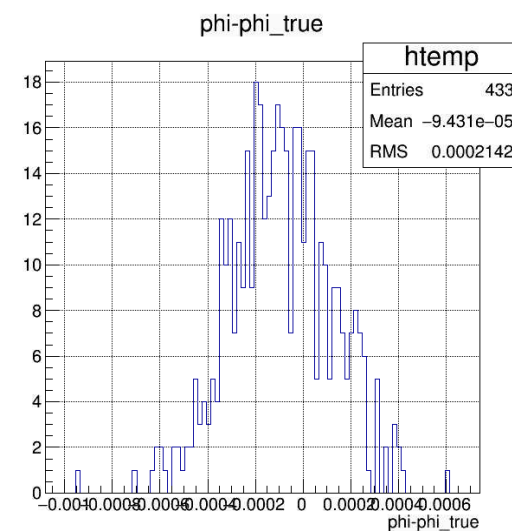
fix angle along x



charge



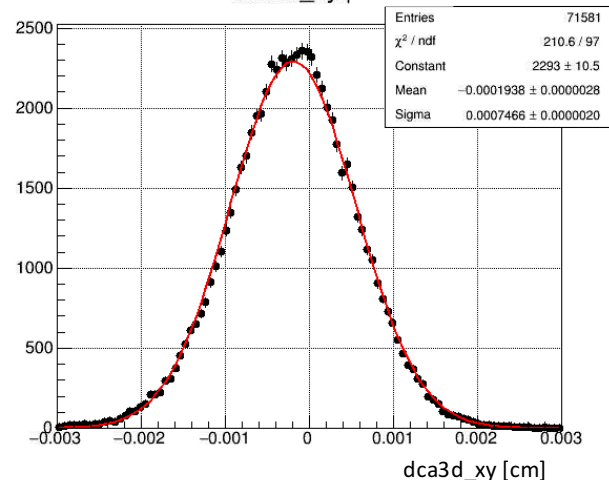
mom along last measurement



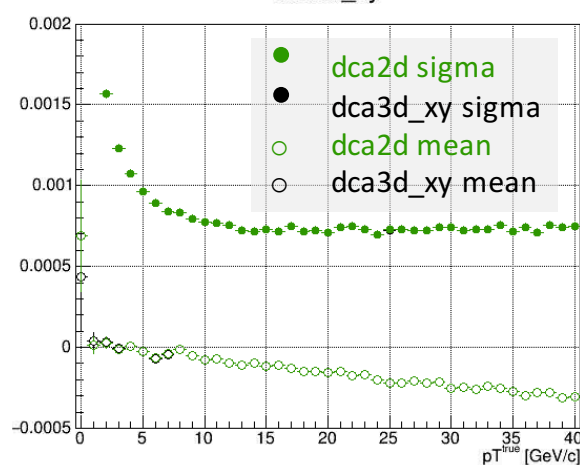
# Dec. 12 10:00 AM, real tracking

0-40 GeV mu+  
 $\eta(-0.5,0.5)$ ,  
 $\phi(-\pi,\pi)$ ,  
vtx(-0.1,0.1) cm

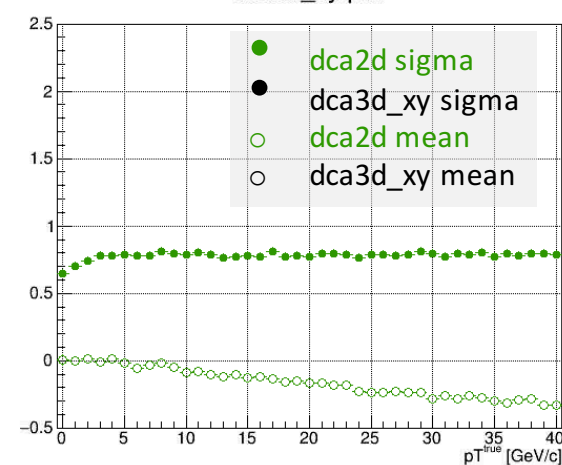
dca3d\_xy |



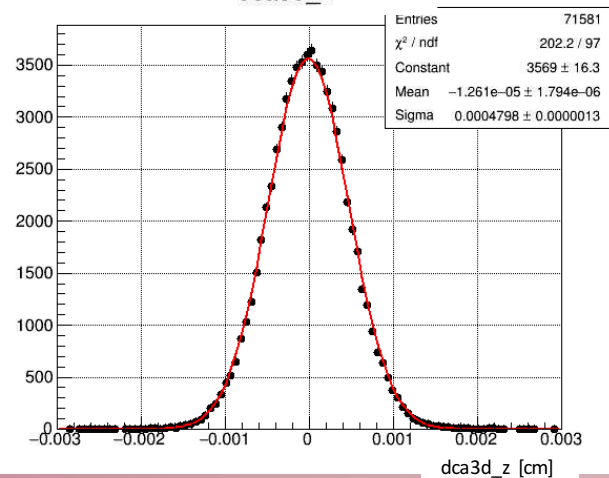
dca3d\_xy



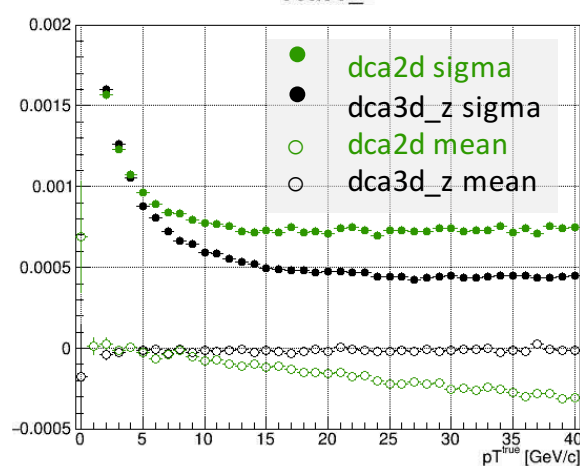
dca3d\_xy pull



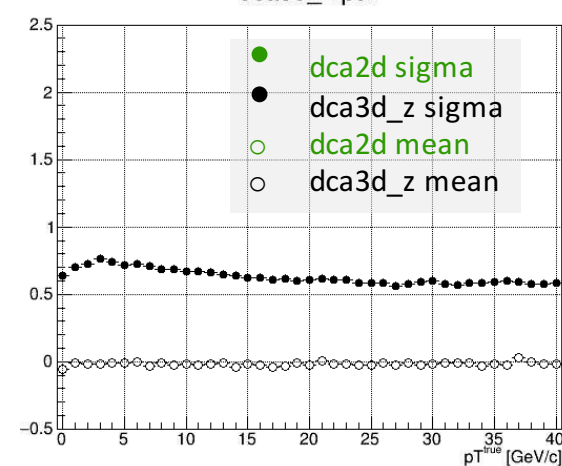
dca3d\_z



dca3d\_z

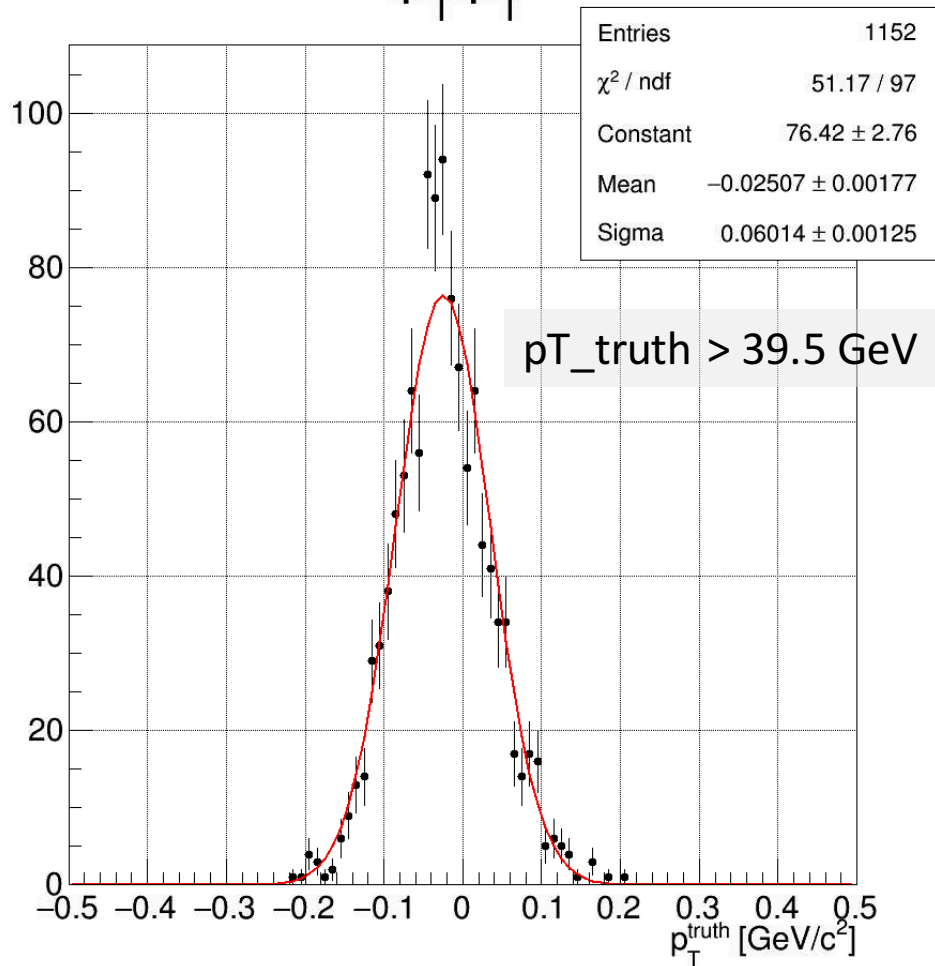


dca3d\_z pull

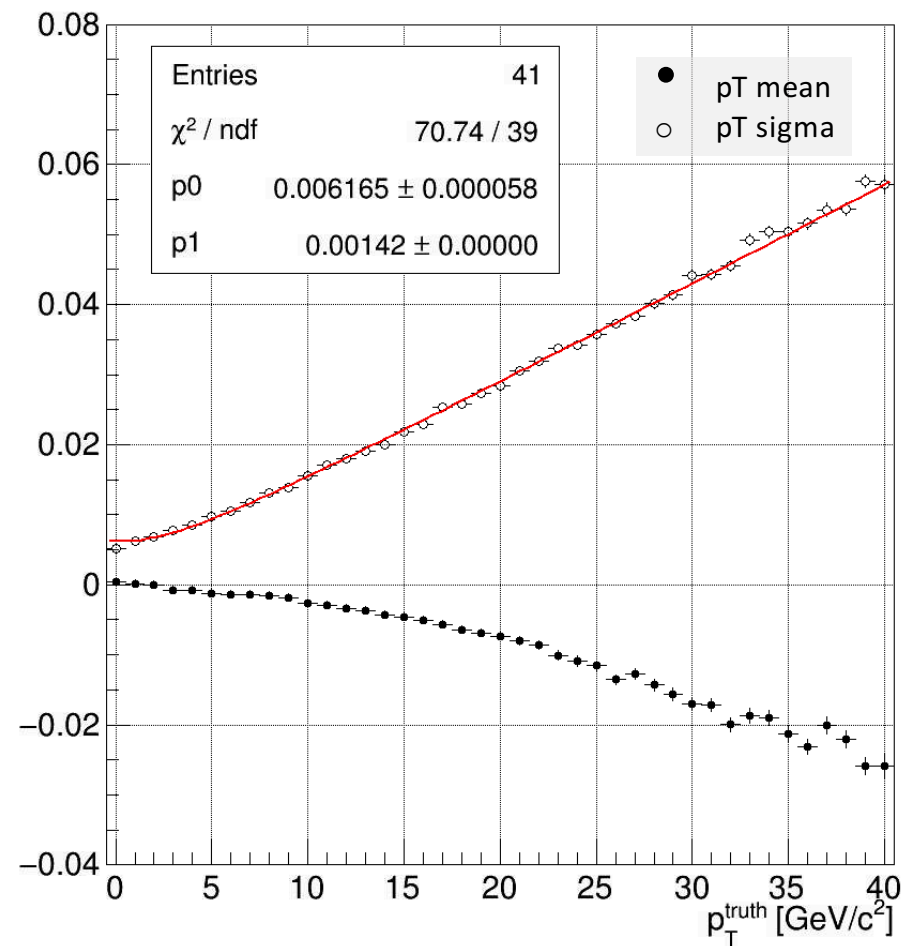




$$\Delta p_T / p_T^{\text{truth}}$$

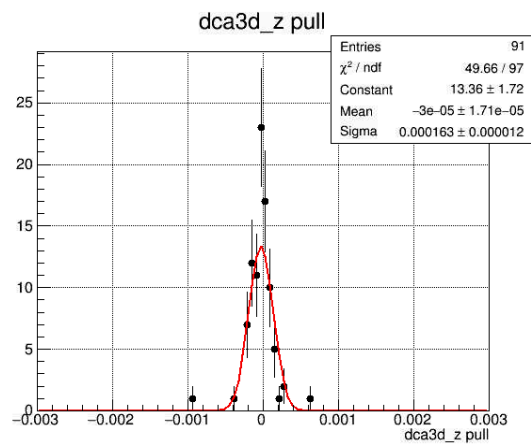
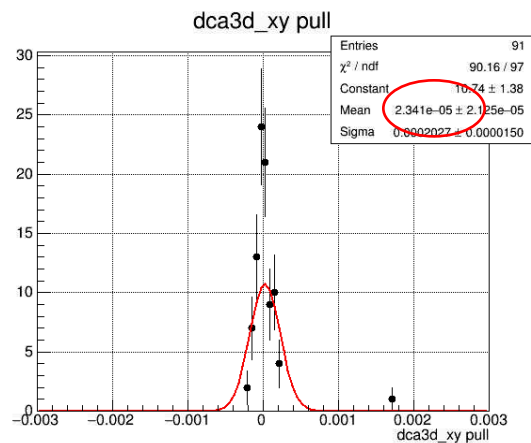


$$\Delta p_T / p_T^{\text{truth}} \text{ vs. } p_T^{\text{truth}}$$

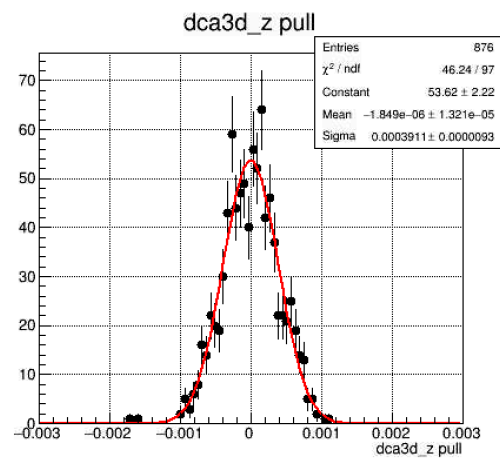
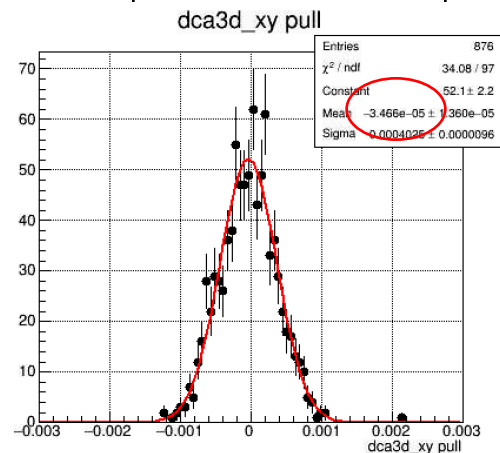


# Truth Tracking Test

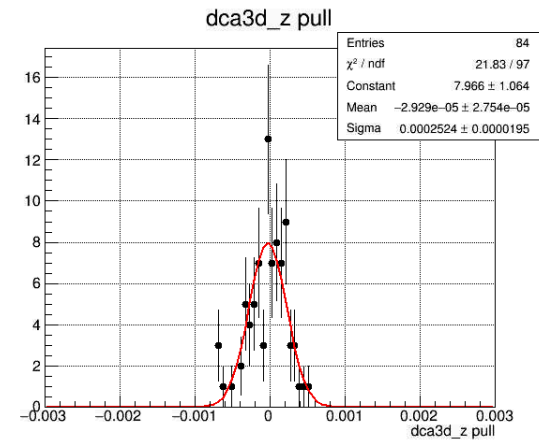
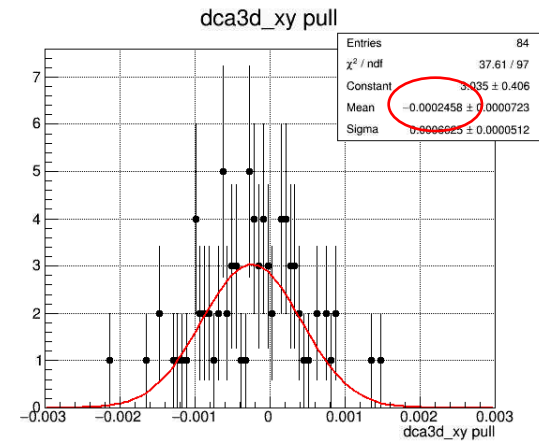
Truth tracking  
both MAPS and TPC



Truth tracking  
TPC only



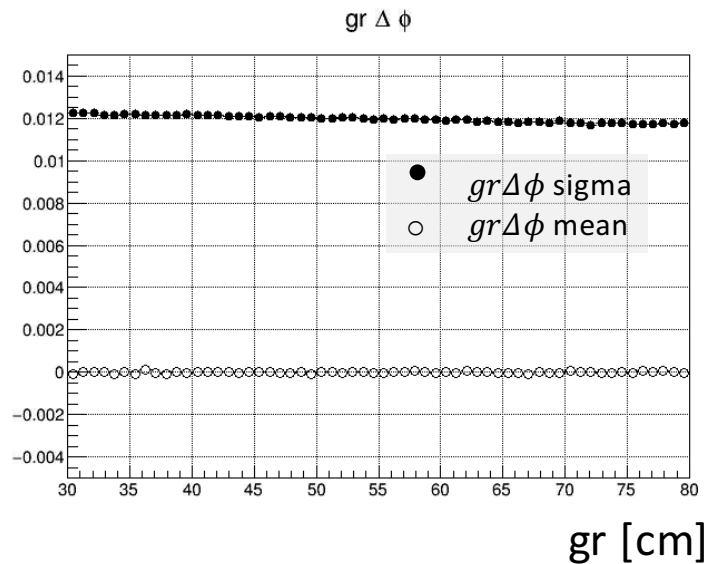
Truth tracking  
MAPS only



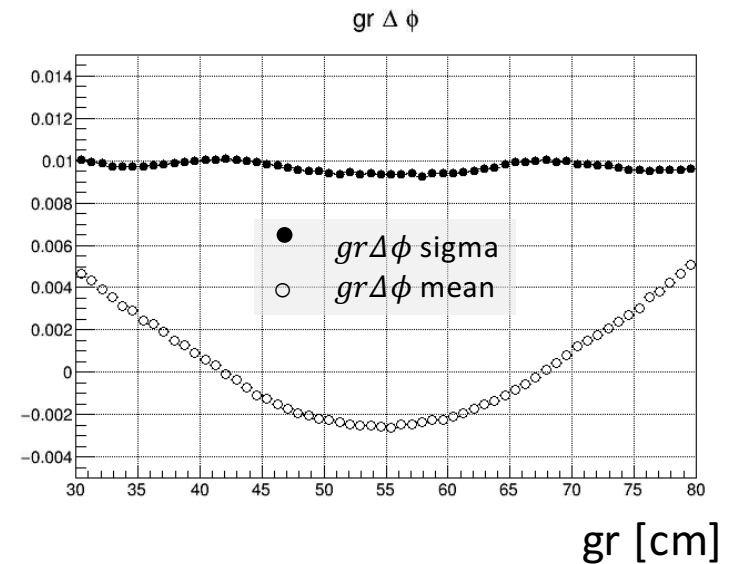
# Inclusive evaluation vs clusters used in tracking evaluation

30-40 GeV  $\mu^+$   
 $\eta(-0.5,0.5)$ ,  
 $\phi(-\pi,\pi)$ ,  
 $vtx(-0.1,0.1)$  cm  
simulated 100k tracks

inclusive cluster evaluation



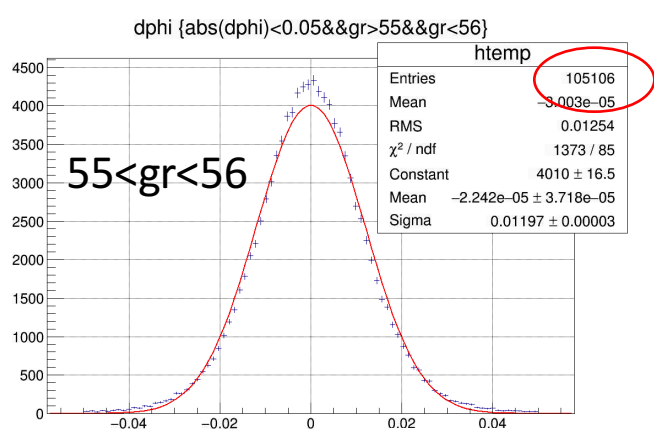
clusters used in track fitting



# Inclusive evaluation vs clusters used in tracking evaluation

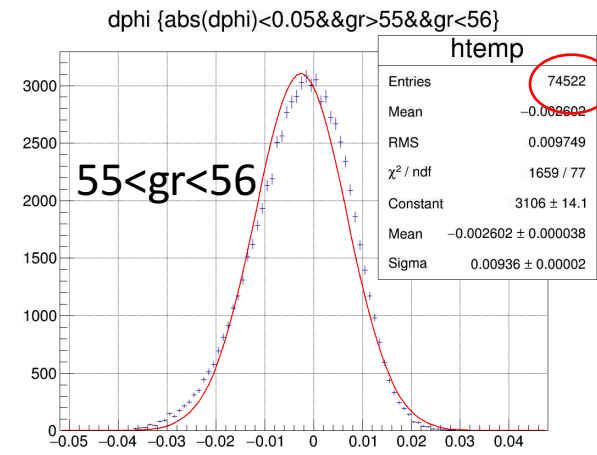
30-40 GeV mu+  
 $\eta(-0.5,0.5)$ ,  
 $\phi(-\pi,\pi)$ ,  
vtx(-0.1,0.1) cm  
simulated 100k tracks

inclusive cluster evaluation

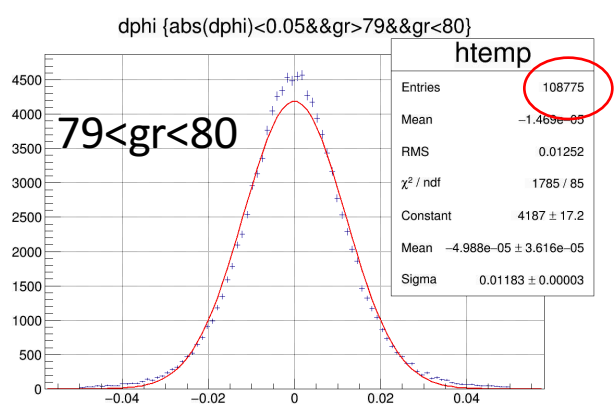


phi - gphi

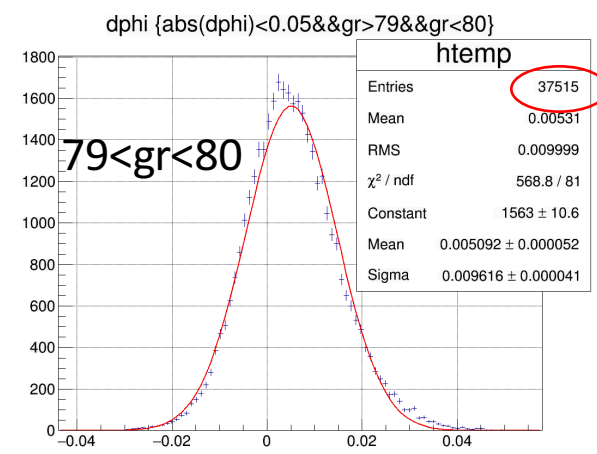
clusters used in track fitting



phi - gphi



phi - gphi

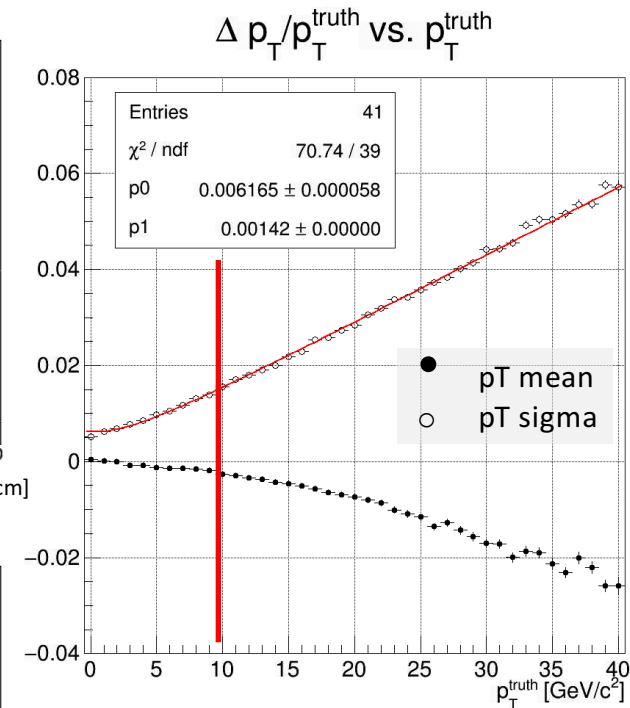
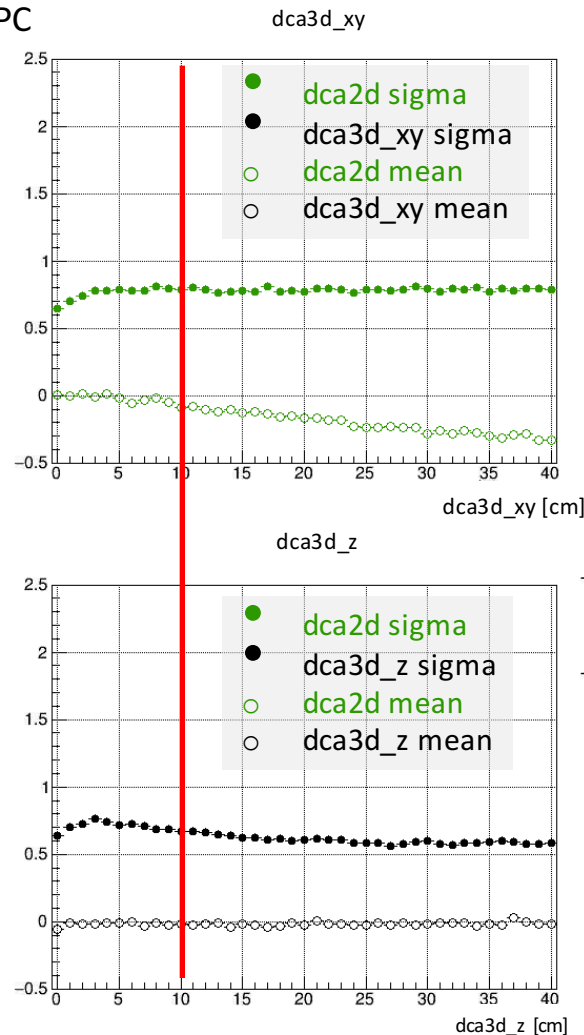


phi - gphi

# Plan

- Would like to run a test run for B-jet tagging using the current configuration.
  - As the tracks used in B-jet tagging are mostly below 10 GeV.
- Work with the TPC group to improve the TPC clustering and tracking.

0-40 GeV mu+  
 $\eta(-0.5,0.5)$ ,  $\phi(-\pi,\pi)$ , vtx(-0.1,0.1) cm

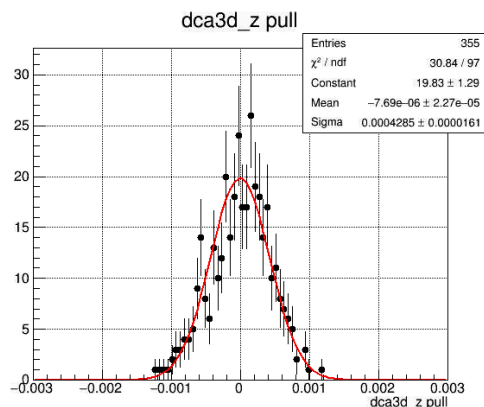
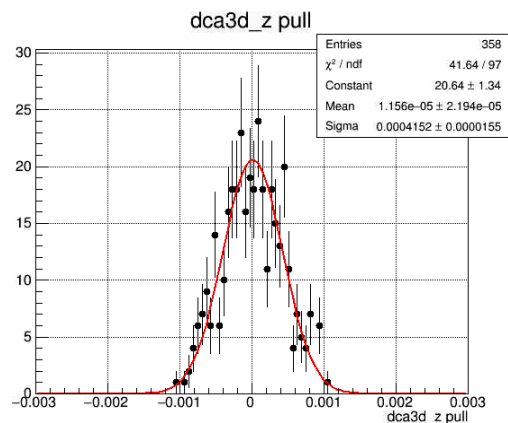
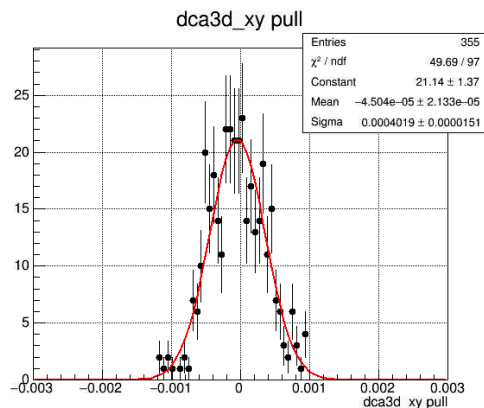
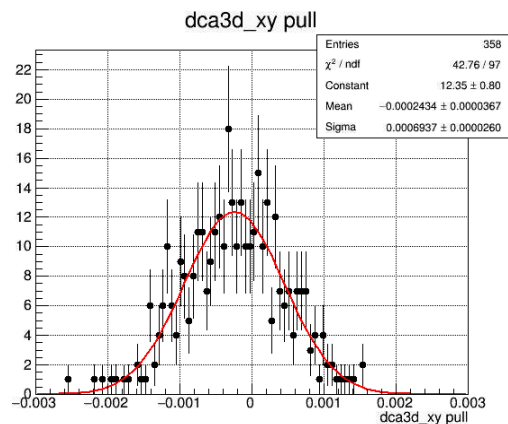


Backups:

# Truth Tracking Test continued

TPC truth r only  
dca3d\_xy still biased

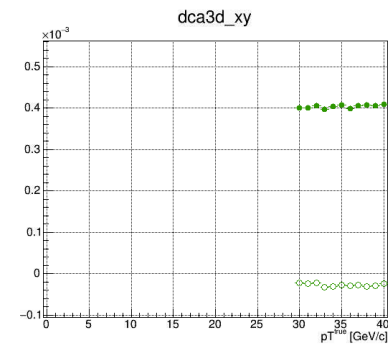
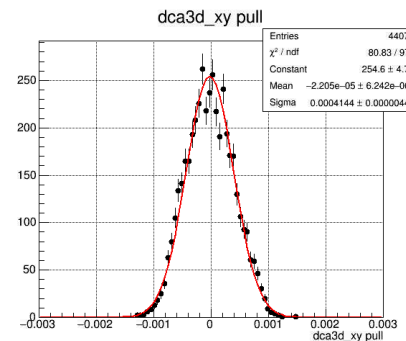
TPC truth phi only  
dca3d\_xy centered



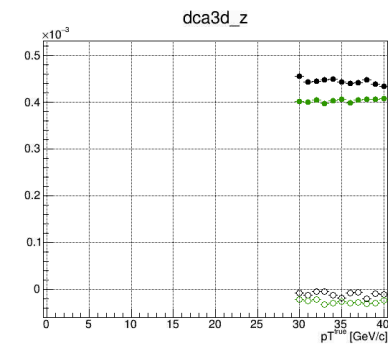
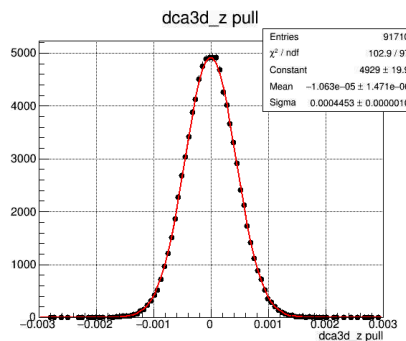
# TPC phi Truth Tracking

30-40 GeV mu+  
 $\eta(-0.5,0.5)$ ,  
 $\phi(-\pi,\pi)$ ,  
 $vtx(-0.1,0.1)$  cm

dca3d\_xy



dca3d\_z



pT

